IN THE SPECIFICATION:

Please replace paragraph number **[0008]** with the following rewritten paragraph:

[0008] Furthermore, individual ~~dies~~ dice generally need to be packaged into a higher assembly before they may be integrated into a system environment. These higher assemblies or packages generally need to accommodate or compensate for differences in thermal expansion between the individual die and the system level substrate. Therefore, there is a need for providing a contact methodology which mediates stresses between dissimilar materials.

Please replace paragraph number **[0011]** with the following rewritten paragraph:

[0011] In another embodiment of the present invention, a method for forming a contact pin assembly wherein the substrate provides the compliant action for the contact pin is provided. The location for the contact pin is defined on the substrate and the substrate is thinned around the location. Further thinning around the contact pin forms a void. The opposite side of the substrate is thinned but not all the way through to the void. ~~Instead~~ Instead, the remaining substrate on the opposite side flexes when the contact end of the contact pin encounters and presses against a pad on a wafer or other device under test.

Please replace paragraph number **[0012]** with the following rewritten paragraph:

[0012] In yet a further embodiment of the present invention, a device assembly for coupling with a device to form an assembly for coupling with a substrate having a contact pad thereon~~. The device assembly~~ includes a contact pin assembly and a device attached thereto.

Please replace paragraph number **[0014]** with the following rewritten paragraph:

[0014] In yet a further embodiment, a method of testing a semiconductor wafer is provided. The method aligns the contact pads on a semiconductor wafer with the corresponding contact pad assemblies of a contactor card and ~~the~~ then mates the card together such that the contact pins compliantly mate with the contact pads. Test signals are applied and monitored

through the contactor card. In still another embodiment of the present invention, a semiconductor wafer testing system is provided and includes a contactor card as described and a tester for generating and analyzing test signals.

Please replace paragraph number **[0016]** with the following rewritten paragraph:

[0016] FIGS. 1A-1I show a sequence of ~~cross-~~cross-sectional views illustrating the process steps of a method for fabricating a compliant contact pin assembly, according to an embodiment of the present invention;

Please replace paragraph number **[0017]** with the following rewritten paragraph:

[0017] FIG. 2 is a ~~cross-~~cross-sectional view illustrating a compliant contact pin assembly, in accordance with one embodiment of the present invention;

Please replace paragraph number **[0018]** with the following rewritten paragraph:

[0018] FIG. 3 is a ~~cross-~~cross-sectional view of a compliant contact pin assembly in a compliant state, in accordance with an embodiment of the present invention;

Please replace paragraph number **[0019]** with the following rewritten paragraph:

[0019] ~~FIG~~FIG. 4 is a ~~cross-~~cross-sectional view of a compliant contact pin assembly, in accordance with another embodiment of the present invention;

Please replace paragraph number **[0020]** with the following rewritten paragraph:

[0020] FIG. 5 is a ~~cross-~~cross-sectional view of a compliant contact pin assembly in a compliant state, in accordance with another embodiment of the present invention;

Please replace paragraph number **[0021]** with the following rewritten paragraph:

[0021] ~~FIGS~~FIGS. 6A-6E show a sequence of ~~cross-~~cross-sectional views illustrating a portion of the process steps of a method for fabricating a compliant contact pin assembly, in accordance with one or more other embodiments of the present invention;

Please replace paragraph number **[0022]** with the following rewritten paragraph:

[0022] FIG. 7 is a ~~cross-~~cross-sectional view illustrating a further process of forming a contact tip, in accordance with a further embodiment of the present invention;

Please replace paragraph number **[0023]** with the following rewritten paragraph:

[0023] FIG. 8 is a ~~cross-~~cross-sectional view illustrating a further process of forming a contact tip, in accordance with another embodiment of the present invention;

Please replace paragraph number **[0027]** with the following rewritten paragraph:

[0027] FIGS. 12A-12C show a sequence of ~~cross-~~cross-sectional views illustrating a further portion of the process steps for fabricating contact ends on a compliant contact pin assembly, in accordance with one or more other embodiments of the present invention;

Please replace paragraph number **[0028]** with the following rewritten paragraph:

[0028] FIGS. 13A-13C show a sequence of ~~cross-~~cross-sectional views illustrating a further portion of the process steps for fabricating contact ends on a compliant contact pin assembly, in accordance with one or more other embodiments of the present invention;

Please replace paragraph number **[0029]** with the following rewritten paragraph:

[0029] FIGS. 14A-14G show a sequence of ~~cross-~~cross-sectional views illustrating a portion of the process steps of a method for fabricating a compliant contact pin assembly, in accordance with yet one or more other embodiments of the present invention;

Please replace paragraph number **[0030]** with the following rewritten paragraph:

[0030] FIG. 15 shows a ~~cross-~~cross-sectional view of a compliant contact pin assembly, in accordance with a further embodiment of the present invention;

Please replace paragraph number **[0031]** with the following rewritten paragraph:

[0031] FIGS. 16A-16F show a sequence of ~~cross-~~cross-sectional views illustrating a portion of the process steps of a method for fabricating a double sided compliant contact pin assembly, in accordance with a yet further embodiment of the present invention;

Please replace paragraph number **[0032]** with the following rewritten paragraph:

[0032] FIG. 17 shows a ~~cross-~~cross-sectional view of a double sided compliant contact pin assembly, in accordance with a yet further embodiment of the present invention;

Please replace paragraph number **[0033]** with the following rewritten paragraph:

[0033] FIG. 18 shows a ~~cross-~~cross-sectional view of a compliant contact pin assembly, in accordance with a further embodiment of the present invention;

Please replace paragraph number **[0034]** with the following rewritten paragraph:

[0034] FIG. 19 is a ~~cross-~~cross-sectional view of a compliant contact pin assembly in a compliant state, in accordance with an embodiment of the present invention; and

Please replace paragraph number **[0036]** with the following rewritten paragraph:

[0036] The present invention, according to the various embodiments described, is drawn to compliant contacting structure and methods for providing electrically conductive contact pins formed from and within a generally planar substrate. The various views and diagrams are illustrated generally as ~~cross-~~cross-sectional views for clarity; however, the specific formed profiles and devices may be arranged across the surface of the substrate and with various

orientations and geometries as are desirable, as will be appreciated by those of ordinary skill in the art.

Please replace paragraph number **[0037]** with the following rewritten paragraph:

[0037] In FIG. 1A, substrate 10 has defined thereon a location 12 for the formation of a contact pin. Substrate 10 may comprise a silicon wafer, a ceramic substrate, a glass substrate, a quartz substrate, or other suitable material. At the location 12, a mask layer 14 is placed on the top or contact end side of substrate 10. The profile of mask layer 14 identifies the general ~~cross~~ cross-sectional geometry of an emerging contact pin to be formed at location 12. Mask layer 14 may be thermally grown silicon oxide, CVD silicon oxide or CVD silicon nitride. Substrate 10 preferably includes a crystal orientation allowing for selectively etching as an isotropic etch. In FIG. 1B, the silicon etch is stopped at a distance 16 corresponding to an approximate contact pin travel distance. The contact travel distance may be heuristically derived as a function of the elasticity or flexibility of the compliant coupling means described below. As illustrated, the etch is preferably an isotropic etch resulting in side walls 18 which exhibit an approximate orthogonal relationship to thinned contact end surface 20.

Please replace paragraph number **[0040]** with the following rewritten paragraph:

[0040] As illustrated in FIG. 1E, a thickness 30 of substrate 10 remains intact to support the emerging contact pin through further manufacturing processes. If substrate 10 is comprised of a semiconductive or conductive material, an insulative layer 31, such as an oxide layer, is formed on the sidewalls of void 28. When substrate 10 is comprised of a nonconductive material, then an insulative layer is unnecessary. In one embodiment, the emerging contact pin 34, in addition to the surfaces defining void 28, are conductively coated by depositing a conductive material 32 generally over the emerging contact pin 34 and throughout the void 28. In one particular~~-embodiment~~ embodiment, as illustrated in FIG. 1F, conductive material 32 is formed through a metallic plating process which results in conductive surfaces on remaining substrate portions 36 and on emerging contact pin 34.

Please replace paragraph number **[0043]** with the following rewritten paragraph:

[0043] In a specific embodiment as illustrated in FIG. 1I, contact pin 42 is further coated with additional conductive material 44 at a bottom or interconnect ~~end 31~~ end to encapsulate the contact pin with additional conductive material. Consistent with the formation of conductive material 32 about the contact end 29 of contact pin ~~32~~ 42 and throughout void 28, conductive material 44 may be formed through various processing steps including electroplating or other plating or coating techniques.

Please replace paragraph number **[0044]** with the following rewritten paragraph:

[0044] FIG. 2 illustrates a contact pin assembly 46, in accordance with one embodiment of the present invention. A compliant axis 48 illustrates the axis of motion of contact pin 42 as a result of the resilient or elastic nature of compliant coupling material 38. Furthermore, in one exemplary embodiment, the compliant coupling material is electrically conductive and is illustrated as compliant coupling material ~~38-'~~ 38′. Electrical continuity exists from contact tip or contact end 50 of contact pin 42 to substrate 10 by way of conductive material 32 electrically coupled with electrically conductive compliant coupling material ~~38-'~~ 38′ which further is electrically coupled to a portion 52 of the conductive material affixed to the remaining substrate 10. Routing of a signal detected at contact end 50 of contact pin 42 may be further routed via one or more conductive traces 54 to other desirable locations. Conductive trace 54 may be formed according to various interconnection techniques including masking, deposition and etching techniques, the specifics of which are appreciated by those of ordinary skill in the art.

Please replace paragraph number **[0045]** with the following rewritten paragraph:

[0045] In FIG. 3, contact pin assembly 46 is illustrated in a compliant state responsive to a device-under-test 56, for example, a semiconductor wafer, with a contact pad 58. The mating or coupling of the device-under-test 56 causes the displacement of contact pin ~~44~~ 42 along a ~~compliance~~compliant axis 48 as compliant coupling material ~~38-'~~ 38′ resiliently deforms or compliantly responds thereto. As illustrated, stops 24 restrict the distance of travel of contact

pin 42 and further protect the device-under-test 56 and contact pin assembly ~~24~~ 46 from damage due to contaminants, for ~~example~~ example, ~~particles,~~ particles between ~~device under test~~ device-under-test 56 and further thinned contact end surface 26.

Please replace paragraph number **[0046]** with the following rewritten paragraph:

[0046] FIG. 4 illustrates a contact pin assembly, in accordance with another embodiment of the present invention. Contact pin assembly ~~46'~~ 46′ includes a contact pin 42 compliantly retained in substrate 10 by way of a nonconductive compliant coupling material 38″. Because of the nonconductive nature of compliant coupling material 38″, electrical coupling must be provided from contact pin 42 to surrounding substrate 10. In the present embodiment, a wire bond 60 is applied between contact pin 42 and conductive trace 54. Wire bonding techniques are known by those of ordinary skill in the art and further discussion of such process is not contained herein.

Please replace paragraph number **[0047]** with the following rewritten paragraph:

[0047] FIG. 5 illustrates a coupling of a device-under-test 56 having a contact pad 58 mating with contact pin assembly ~~46'~~ 46′. As illustrated, contact pin 42 compliantly deflects along compliant axis 48 due to the resiliency of compliant coupling material 38″. Also illustrated, wire bond 60 further deforms in response to the compliant motion of contact pin 42 thereby maintaining electrical continuity between contact pin 42 and conductive trace 54.

Please replace paragraph number **[0048]** with the following rewritten paragraph:

[0048] FIGS. 6A-6D illustrate yet another method of formation of a contact pin for use in a contact pin assembly, in accordance with another embodiment of the present invention. In the present embodiment, processing of substrate 10 follows preliminary processing steps according to FIGS. 1A-1E. Prior thereto, however, a bore 62 is formed entirely through substrate 10, for example, centered within location 12, and through the emerging contact pin. Boring techniques may include those utilized for the formation of voids 28, namely etching and

or laser ablating techniques. In FIG. 6B, bore 62 (FIG. 6A) is filled with a conductive material 64 which may be formed using plating, sputtering, ~~squeegeing~~ squeegeeing or other conductive fill techniques known by those of ordinary skill in the art. This may also be effected prior to the steps of FIGS. 1A-1E. In FIG. 6C, voids 28 (FIG. 6A) are filled with compliant coupling material 38 according to techniques described above with reference to FIG. 1G. In FIG. 6D, an etching or abrasive process, such as mechanical grinding or abrasive planarization such as Chemical Mechanical Planarization (CMP), removes the backside of substrate 10 for at least a distance or thickness 30 to release the emerging contact pin to form contact pin 66.

Please replace paragraph number **[0050]** with the following rewritten paragraph:

[0050] The ends of contact pin 66 are preferably conductively coated to further facilitate electrical coupling. FIG. 7 and FIG. 8 illustrate various contact ends or tips that may be formed upon contact ~~pin~~ pins 66, 67, in accordance with respective embodiments of the present invention. In FIG. 7, a conductive material 68 is formed to provide electrical continuity with conductive material 64. Conductive material 68 may be formed using plating or other deposition processes which results in a conductive contact surface for mating with device-under-test 56 (FIGS. 3 and 5). In FIG. 8, a bump of conductive material 70 is formed on contact pin ~~64~~ 66 for providing electrical continuity with conductive material 64. In the present embodiment, conductive material 70 may be formed using solder bumping technology such as that utilized in the formation of balls of a ball grid array (BGA) or by using a wire bond capillary to place a bump of conductive material 70. The formation of such conductive bumps is known by those of ordinary skill in the art and is not further described herein.

Please replace paragraph number **[0051]** with the following rewritten paragraph:

[0051] FIGS. 7 and 8 further illustrate the formation of one or more conductive traces 54 and the electrical coupling of conductive material 64 with a yet further conductive material 72 for providing electrical conduction with a ~~conductive~~ compliant coupling

material 38. The embodiments as illustrated in FIGS. 7 and 8 may also incorporate a wire bond 60 (FIG. 4) when ~~non-~~nonelectrically conductive compliant coupling material is employed.

Please replace paragraph number **[0052]** with the following rewritten paragraph:

[0052] FIG. 9 illustrates a device assembly utilizing a contact pin assembly, in accordance with another embodiment of the present invention. While compliant coupling of a contact pin assembly for temporary ~~interconnect~~ interconnection with a device-under-test are illustrated herein, various embodiments of the present invention also find application when permanently coupled with one or more devices to form a device assembly for further integration or coupling with a ~~substrate~~ substrate, such as a printed circuit board. A device assembly 112 includes a contact pin assembly 102, formed in accordance with the one or more embodiments described herein, and one or more devices 104 permanently coupled thereto. The one or more devices 104 include one or more contact pads 108 which electrically interface with the one or more contact pins 106 of the contact pin assembly 102. The device assembly 112 may then be further coupled to contact pads 110 on a substrate 114. Electrical coupling techniques for coupling devices 104 to substrate 114 via the contact pin assembly 102 are appreciated by those of ordinary skill in the art and therefore are not further described herein.

Please replace paragraph number **[0053]** with the following rewritten paragraph:

[0053] Coupling of one or more devices 104 to a substrate 114 via a contact pin assembly 102 finds application by providing an intermediary expansion medium, namely the contact pin assembly 102, for mediating variations in the expansion between devices 104 and substrate ~~108~~ 114 when operated over temperature variations. Electrical continuity between contact pads 108 and 110 are maintained by the compliant coupling material of the contact pins 106 within the contact pin assembly 102.

Please replace paragraph number **[0054]** with the following rewritten paragraph:

[0054] FIG. 10 illustrates a device assembly utilizing a contact pin assembly, in accordance with yet another embodiment of the present invention. In the present embodiment, a redistribution layer may be implanted through the use of a contact pin assembly external to the active devices. Those of skill in the art appreciate that additional processing steps performed on active devices results in a decreased yield of operation devices due to the additional handling and processing parameters, such as elevated temperatures. Therefore, in the present embodiment, the redistribution of inner lead contact pads 118 to outer lead bond contact pads 110 is accomplished ~~throught~~ <u>through</u> coupling a contact pin assembly 122 to a device 104. Specifically, a device assembly 132 includes a contact pin assembly 122, formed in accordance with the one or more embodiments described herein, and one or more devices 104 permanently coupled thereto. The one or more devices 104 include one or more contact pads 118 which electrically interface with the one or more contact pins 116 of the contact pin assembly 122. The device assembly 132 may then be further coupled to contact pads 110 on a substrate 114. Electrical coupling techniques for coupling devices 104 to substrate 114 via the contact pin assembly 102 are appreciated by those of ordinary skill in the art and therefore are not further described herein.

Please replace paragraph number **[0055]** with the following rewritten paragraph:

[0055] Coupling of a device 104 to a substrate 114 via a contact pin assembly 122 finds application by providing an intermediary expansion medium, namely the contact pin assembly 122, for mediating variations in the expansion and redistributing interconnects from an inner lead ~~bond~~ <u>contact</u> pad 118 to an outer lead ~~bond~~ <u>contact</u> pad 110. Electrical continuity between contact pads 108 and 110 are maintained by the compliant coupling material of the contact pins 116 and a redistribution conductive trace 124 within the contact pin assembly 122.

Please replace paragraph number **[0057]** with the following rewritten paragraph:

[0057] A bore 262 is formed entirely through substrate 10, exemplary centered about location 12, and through the emerging contact pin. Boring techniques may include those utilized

for the formation of voids 28, namely etching and or laser ablating techniques. In FIG. 11B, bore 262 (FIG. 11A) is filled with a conductive material 264 which may be formed from a conductive polymer. While the filling process may be done using various techniques, two exemplary ~~techniques include squeegeeing~~ techniques, include squeegeeing the material ~~through~~ through, or drawing the material through bore ~~262~~ 262, are contemplated. In FIG. 11C, voids 28 are filled with compliant coupling material 38 according to techniques described above with reference to FIG. 1G and the contact pin is released from the remaining substrate portions, according to the process described above with reference to FIG. 1H, wherein the back or opposite surface of substrate 10 is thinned, either through an etching process or through a mechanical grinding process.

Please replace paragraph number **[0059]** with the following rewritten paragraph:

[0059] The ends of contact ~~pin~~ pins 266, 267 are preferably coated to further facilitate electrical coupling and/or to extend the end of the contact pin above the substrate. FIG. 12B and FIG. 13B illustrate various contact ends or tips that may be formed upon contact pins 266, 267, in accordance with respective embodiments of the present invention. In FIG. 12B, conductive material 268 and 272 are formed to provide electrical continuity with conductive material 264. Conductive material 268 and 272 may be formed using plating or other deposition processes, including the formation of conductive polymer bricks or blocks which results in a conductive contact surface for mating with contact pad 58 of device-under-test 56 (FIG. 12C). In FIG. 13B, a conductive material 270 is formed on contact pin 267 for providing electrical continuity with conductive material 264. In the present embodiments, conductive material 270 and 274 may be formed using, for example, ~~including~~ conductive deposition techniques described above, ~~including~~ conductive polymer bricks on the top and/or bottom of contact pin 267 which results in a conductive contact surface for mating with contact pad 58 of a device-under-test 56 (FIG. 13C). Conductive material 270 and 274 formed of conductive polymers may provide additional compliant force due to the intrinsic compressibility of, for example, the polymer.

Please replace paragraph number **[0060]** with the following rewritten paragraph:

[0060] As a further enhancement to the contact pin 267, while the conductive ~~pads~~ material 270, ~~274 are~~ 274, is in a "wet" or semi-cured state, flakes of material such as dendritic material for scrubbing the material to be probed by the contact pin may be applied to conductive ~~pads~~ material 270, 274. FIGS. 12C and 13C further illustrate the formation of one or more conductive traces 254, 255 and the electrical coupling of conductive material 264 with a yet further conductive material 268, 272 and 270, 274 for providing electrical conduction with a conductive compliant material 238.

Please replace paragraph number **[0061]** with the following rewritten paragraph:

[0061] FIGS. 14A-14G show a sequence of ~~cross~~ cross-sectional views illustrating a portion of the process steps of a method for fabricating a compliant contact pin assembly, according to another embodiment of the present invention. The present embodiment utilizes an initial masking process to develop a very fine resolution pin outline having one or more pyramid-like shapes. Additional texturing or profiles may be developed for facilitating enhanced coupling by the contact pin, such as, for example, penetrating an oxide layer on an integrated circuit pad.

Please replace paragraph number **[0062]** with the following rewritten paragraph:

[0062] In FIG. 14A, substrate 10 has defined thereon a location ~~112~~ 412 for the formation of a contact pin. At the location ~~112~~ 412, a mask layer ~~114~~ 414 is placed on the top or contact end side of substrate 10. The profile of mask layer ~~114~~ 414 identifies the general ~~cross~~ cross-sectional geometry of an emerging contact pin. Mask layer ~~114~~ 414 may be one of various masking compositions ~~and,~~ and is preferably a nitride mask, commonly known as a "nitride hard mask." While mask layer ~~114~~ 414 may completely mask the area of the substrate 10 at location ~~112~~ 412, FIG. 14A further illustrates another optional aspect of the invention wherein texturing or profiles may be formed using one or more openings or apertures within mask layer ~~114~~ 414, an example of which is illustrated as apertures ~~116~~ 416. When profiles are desired

at the contact end of the contact pin, a first mask ~~114~~ layer 414 is ~~place~~ placed at location ~~112~~ 412 to form any desired profile features, such as stops or self-limiting contacts. Substrate ~~110~~ 10 may be etched under controlled conditions to obtain the fine profile features. A mask ~~114~~ layer 414 may be placed over the entire location ~~112~~ 412 including the formed profiles. Substrate 10 is bulk etched using, for example, a KOH etch process ~~at to~~ to obtain a pyramidal-shaped etch plane.

Please replace paragraph number **[0063]** with the following rewritten paragraph:

[0063] In FIG. 14B, the processing of apertures ~~116~~ 416 results in the formation of profiles ~~118~~ 418 configured for enhancing the penetration of, for example, oxide layers inhibiting direct contact with underlying conductive contacts or traces of an integrated circuit pad. By way of relative dimensioning, profiles ~~118~~ 418 are relatively short in order to be self-limiting when subjected to a contact pad of a device-under-test. By way of example and not limitation, profiles ~~118~~ 418 may be fabricated with a height of approximately 0.33 μm. While FIGS. 14A-14G illustrate the formation of profiles ~~118~~ 418, the formation of the profiles ~~118~~ 418 is optional.

Please replace paragraph number **[0064]** with the following rewritten paragraph:

[0064] In FIG. ~~1B~~ 14B, the silicon etch is stopped at a distance 120 corresponding to an approximate contact pin travel distance. The contact travel distance may be heuristically derived as a function of the elasticity or flexibility of the compliant coupling means described, ~~and~~ and, for one ~~application~~ application, may be on the order of 75 μm. As illustrated, the etch is preferably an isotropic etch resulting in the side walls ~~122~~ 422 which exhibit an approximate pyramidal relationship to thinned contact end surface ~~124~~ 424.

Please replace paragraph number **[0065]** with the following rewritten paragraph:

[0065] In FIG. 14C, the depth of the emerging contact pin is generally defined through the formation of a void 126 surrounding the emerging contact pin. Void 126 may be formed in

one of several manners including a photo etch process wherein other portions of the substrate are masked and protected from the etching process. Alternatively, void 126 may be formed through laser ablation or machining, as described above with reference to FIG. 1. As illustrated in FIG. 14C, a thickness 128 of substrate 10 remains intact to support the emerging contact pin through further manufacturing processes. When substrate 10 is ~~semi-~~semiconductive or conductive, an insulating oxide layer 127 is formed within void 126 to insulate any electrical signals from becoming shorted or exhibiting crosstalk.

Please replace paragraph number **[0066]** with the following rewritten paragraph:

[0066] In FIG. 14D, the emerging contact pin ~~132~~ 432 in addition to the surfaces of void 126 are conductively coated by depositing a conductive material 130 generally over the emerging contact pin ~~132~~ 432 and throughout the void 126. Conductive material 130 may be formed through a metallic plating process, sputtering process, or other particle deposition ~~processes~~ process which results in conductive surfaces on remaining substrate portions 134 and on emerging contact pin ~~132~~ 432.

Please replace paragraph number **[0067]** with the following rewritten paragraph:

[0067] A compliant coupling structure couples emerging contact pin ~~132~~ 432 with remaining substrate portions 134 of substrate 10. By way of example and not limitation, FIG. 14E illustrates one such structure as compliant coupling material 136. Compliant coupling material 136 at least partially fills void 126 and forms a flexible or compliant interface between emerging contact pin ~~132~~ 432 and remaining substrate portions 134 of substrate 10. In FIG. 14F, the back or opposite surface 138 of substrate 10 is thinned either through an etching process or through a mechanical grinding or abrasion process for at least a thickness or distance 140 to release or free contact pin 142 from adjacent substrate portions 134 of substrate 10. As illustrated, contact pin 142 is formed from a portion of substrate 10 and remains positioned at original location ~~112~~ 412 through compliant coupling means, namely compliant coupling material 136.

Please replace paragraph number **[0068]** with the following rewritten paragraph:

[0068] In FIG. 14G, contact pin assembly 144 may further include a redistribution ~~layer~~ layer, such as conductive trace ~~146~~ 146, for electrically routing contact pin 142 to a separate location. FIG. 14G further illustrates a via 148 which may further electrically couple conductive trace 146 to an opposite side 150 of substrate ~~110~~ 10 for further routing on opposite side 150 or for coupling with a probe 152 at a contact pad 154. Additionally, contact pin 142 may be further coated with additional conductive material 156 at a bottom or interconnect end to encapsulate the contact pin 142. Consistent with the formation of conductive material 130 (FIG. 14D) about the contact of contact pin ~~132~~ 432 and throughout void 126, conductive material 156 may be formed through various processing steps including plating, sputtering or other coating approaches.

Please replace paragraph number **[0069]** with the following rewritten paragraph:

[0069] FIG. 15 shows a ~~cross~~ cross-sectional view illustrating a compliant contact pin assembly, according to yet another embodiment of the present invention. The present embodiment accommodates inline probing of the back of the contact pin 162 without subjecting the contact pad of a device-under-test to the damaging effects of a direct probe. A contact pin assembly 158 is generally fabricated according to the steps of FIGS. 14A-14E, however, a via 160 is formed, for example through laser machining, through the contact pin 162. Via 160 is then filled with a conductive material 164 for electrically coupling the contact end 163 of contact pin 162 with the opposite side 170 of contact pin assembly 158. An additional contact pad 166 may be further formed for direct probing by a probe 168.

Please replace paragraph number **[0070]** with the following rewritten paragraph:

[0070] FIGS. 16A-16F and FIG. 17 show ~~cross~~ cross-sectional views illustrating various embodiments of dual sided compliant contact pin assemblies. These embodiments facilitate the formation of compliant contacts on both sides of a contact pin assembly to accommodate an offset configuration or a redistribution arrangement.

Please replace paragraph number **[0074]** with the following rewritten paragraph:

[0074] As illustrated in FIG. 16C, if substrate 10 is comprised of a ~~semi-~~semiconductive or conductive material, an insulative layer 331, such as an oxide layer, is formed on the sidewalls of voids 328, 329 and via voids 316, 317. When substrate 10 is comprised of a nonconductive material, then an insulative layer is unnecessary. In one embodiment, the emerging contact pins 334 and 335 in addition to the surfaces of voids 328, 329 and via voids 316, 317 are conductively coated by depositing a conductive material 32 generally over the emerging contact pins 334 and 335 and throughout the voids 328, 329. Conductive material 32 is further deposited about via voids 316, 317 forming a conductive via 319. In one particular embodiment, conductive material 32 is formed through a metallic plating process which results in conductive surfaces.

Please replace paragraph number **[0075]** with the following rewritten paragraph:

[0075] As illustrated in FIG. 16D, a compliant coupling structure couples emerging contact pins 334 and 335 with surrounding remaining portions 336 of substrate 10. By way of example and not limitation, one such structure is compliant coupling material 38. Compliant coupling material 38 at least partially fills voids 328 and 329 and forms a resilient compliant interface between emerging contact pins 334 and 335 with remaining substrate portions 336 of substrate 10. Suitable compliant coupling materials were described above with reference to FIG. 1. In another embodiment, conductive via 319 may be further filled with compliant coupling material 38 in lieu of ~~masking via 319~~ voids 328, 329 from being filled.

Please replace paragraph number **[0076]** with the following rewritten paragraph:

[0076] To enable compliant movement relative to the remaining substrate portions ~~36~~ 336, the contact pins are released from the remaining substrate portions 336 by ~~thinning~~ second side 315 by at least a distance 330 to release emerging contact pin 334 and correspondingly ~~thinning~~ first side 314 by at least a distance ~~331~~ 531 to release emerging contact pin 335. In FIG. 16E, the surface of first side 314 is masked and the surface of second side 315

of substrate 10 is thinned either through an etching process for at least a thickness or distance 330 to release or free contact pin 342 from adjacent portions of substrate 10. Similarly, the surface of ~~thinned~~ second side 315 is masked and the surface of first side 314 of substrate 10 is thinned for at least a thickness or distance ~~331~~ 531 to release or free contact pin 343 from adjacent portions of substrate 10. As illustrated, contact pins 342 and 343 are formed from a portion of substrate 10 and remain positioned at original region or location 312 (FIG. 16A) through compliant coupling means, namely compliant coupling material 38.

Please replace paragraph number **[0077]** with the following rewritten paragraph:

[0077] FIG. 16F illustrates a contact pin assembly 346, in accordance with one embodiment of the present invention. Compliant axis 348 relative to contact pin 342 and compliant axis 349 relative to contact pin 343 ~~illustrates~~ illustrate the axis of motion of contact pins 342, 343 as a result of the resilient or elastic nature of compliant coupling material 38. Furthermore, in one exemplary embodiment, the compliant coupling material is electrically conductive and is illustrated as compliant coupling material 38. Electrical continuity exists from contact tip or contact end 350 of contact pin 342 to substrate 10 by way of conductive material 32 electrically coupled with electrically conductive compliant coupling material 38 which further is electrically coupled to a portion 352 of the conductive material affixed to the remaining substrate 10. Routing of an electrical signal detected at contact end 350 of contact pin 342 may be further routed via one or more conductive traces 354 to conductive via 319. Similarly, electrical continuity exists from contact tip or contact end 351 of contact pin 343 to substrate 10 by way of conductive material 32 electrically coupled with electrically conductive compliant coupling material 38 which further is electrically coupled to a portion 353 of the conductive material affixed to the remaining substrate 10. Routing of a signal detected at contact end 351 of contact pin 343 may be further routed via one or more conductive traces 355 to conductive via 319. Conductive traces 354, 355 may be formed according to various interconnection techniques including masking, deposition and etching techniques, the specifics of which are well known to those of ordinary skill in the art.

Please replace paragraph number **[0078]** with the following rewritten paragraph:

[0078] FIG. 17 illustrates a contact pin assembly 366, in accordance with another embodiment of the present invention. Contact pins 362, 363 may be formed according to the processes described with respect to FIGS. 16A-16E. In the present embodiment, electrical continuity between contact pins 362, 363 is formed by a conductive trace on one or more sides 364,~~366~~ 566. By way of example, FIG. 17 illustrates a conductive trace 368 formed on a first side 364 and coupled between a portion 370 of the conductive material affixed to the remaining substrate 10 of contact pin 362 and a portion 372 of the conductive material affixed to the remaining substrate 10 of contact pin 363. The present embodiment further includes electrically conductive compliant coupling material 38 for providing electrical continuity between contact end 374 of contact pin 362 and portion 370 of the conductive material affixed to the remaining substrate 10. Similarly, contact end 376 of contact pin 363 is electrically coupled to portion 372 by electrically conductive compliant coupling material 38.

Please replace paragraph number **[0079]** with the following rewritten paragraph:

[0079] FIG. 18 illustrates a contact pin assembly 74, in accordance with another embodiment of the present invention. The processing steps for the formation of contact pin assembly 74 occur according to the processing steps of FIGS. 6A-6B to form voids 76 around contact pin 78 with the center bore being filled with a conductive material 80 coupled to an electrical trace 82. According to the present embodiment, a compliant coupling structure provides the compliant action for contact pin 78. In the present embodiment, the compliant coupling structure, by way of example and not limitation, is implemented as a thinned substrate web 84 which is thinned according to the corresponding widths of~~void~~ voids 76. The thinning process enables contact pin 78 to flex, as illustrated in FIG. 19, when a device-under-test 56 having a contact pad 58 is coupled therewith. Additionally, according to FIG. 18, various contact ends or tips 86 may be formed according to deposition, plating or other processes known by those of ordinary skill in the art.

Please replace paragraph number **[0081]** with the following rewritten paragraph:

[0081] The foregoing descriptions of specific embodiments of the present invention have been presented for purposes of illustration and description. They are not intended to be exhaustive or to limit the invention to the precise forms disclosed, and many modifications and variations are possible in light of the above teaching. The embodiments were chosen and described in order to best explain the principles of the invention and its practical application, to thereby enable others of ordinary skill in this art to best utilize the invention and various embodiments with various modifications. It is intended that the scope of the inventions be identified by the claims appended hereto and their ~~equivalence~~ <u>equivalents</u>.